Langley Research Center

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PERSONNEL PROTECTION - CLOTHING AND EQUIPMENT

National Aeronautics and Space Administration

Responsible Office: Office of Safety and Mission Assurance

PREFACE

This Langley Research Center Procedural Requirementslines (LPR) is published to establish the standards for the management of protective clothing and equipment on Langley Research Center (LaRC). The management of the protective clothing and equipment process includes the responsibilities for the acquisition, issuance, control, and maintenance of these items.

LPR 1710.4, “Personnel Protection - Clothing and Equipment,” dated July 1999, is rescinded and should be destroyed.

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Deputy Director

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SDL 040, SDL 043, SDL 410, SDL 411, and SDL 412 (LaRC Safety Manual Holders)
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Chapter 1

1. INTRODUCTION

1.1 PURPOSE

This LPR sets forth the LaRC requirements for the management of protective clothing and equipment on LaRC. It also outlines the responsibilities for the acquisition, issue, control, and maintenance of Government issued protective clothing and equipment.

1.2 APPLICABILITY

This LPR applies to LaRC civil servants, contractors, and other agency employees who perform work on LaRC, and is applicable to all LaRC organizational elements regardless of their work site location.

1.3 PRESCRIBING DOCUMENTS

The following are the prescribing documents governing the management of equipment and protective clothing on LaRC.

1.3.1 Authority

- Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, Regulation 29 CFR 1910.
- Executive Order No. 12196, 26 February 1980, “Occupational Safety and Health for Federal Employees.”
- American National Standards Institute (ANSI) Z88.2, Z88.5, Z86.1 and Z87.1.

1.3.2 References

- NASA Policy Directive 8710.2B, “NASA Safety and Health Program Policy.”
- LAPD 1700.2, “Safety Assignments.”
- LPR 1710.5, "Ionizing Radiation."
- LPR 1710.8, "Nonionizing Radiation."
- LPR 2710.1, “LaRC Noise Control and Hearing Conservation Program.”
- Langley Form 59, "Certification for Industrial Grade Safety Glasses."
- Langley Form 73, "SCBA Inspection After Each Use Form."
- Langley Form 80, "SCBA Inspection and Maintenance Report for Self-Contained Breathing Apparatus."
- Langley Form 125,"Purchase Request/Purchase Order."
- Mine Safety Appliances (MSA) Bulletin No. 0105-51.

1.4 GENERAL

Personal protective equipment and devices are required to be used by all employees working on-site, as prescribed in the regulations listed above in paragraph 1.3. These regulations are established to ensure that LaRC employees and management personnel comply with the following procedures:

1.4.1 Issuance of Proper Equipment and Clothing

LaRC requires that all employees be adequately protected when working around hazards. Additionally the Center shall furnish and maintain necessary items of safety equipment and clothing to provide this protection. Protective equipment and clothing shall be used or worn whenever employees encounter the following hazards in the work environment:

- Chemical hazards
- Radiological hazards,
- Mechanical-particulate hazards, or
- Toxic irritant hazards.

Protective equipment or clothing shall be used whenever a workplace hazard has the potential to cause an injury or impairment to an individual. Protective equipment and clothing is required when it can prevent hazards from being absorbed, inhaled, or contacting skin.

1.4.2 Safety Planning for New Operations

Research and engineering personnel shall coordinate in advance with Facility Coordinators (FC's), Facility Safety Heads (FSH's), and the Safety Manager when planning new operations or tests. Safety planning ensures a review of the protective devices, required to operate a facility safely, have been properly evaluated. Also, planning ensures that line supervisors have required personnel within their organization to use proper protective clothing and devices during operations or tests. The process also ensures that personnel have received training in the use, limitations, and maintenance of required safety items.

1.4.3 Properly Maintain Equipment

Users shall ensure that issued safety equipment is maintained in serviceable condition at all times. Also, all equipment shall be cleaned, stored, and maintained ready for use. The requirements for maintaining safety equipment can be found in OSHA 1910, Subpart I.

1.4.4 Sanitize Equipment and Clothing

When safety equipment and clothing is turned in by an employee, the item shall be cleaned before another employee is allowed to reuse it. Additionally, whenever equipment or clothing is worn in contact with an employee's body, it shall be sanitized before it is reissued to another employee.

1.5 DEFINITIONS

The following definitions apply to this LPR:

- **Protective Clothing** - An article of clothing furnished to an employee at Government expense. Typical items of protective clothing are: boots, hard hats, helmets and shields, safety goggles and spectacles, and gloves.

  Protective clothing shall be worn for the following purposes:

  - For personal safety and protection when performing work assignments in a potentially hazardous work environment or performing work under hazardous conditions, or
  - When environmental conditions require protective apparel, such as clean rooms, medical services labs, etc.

- **Protective Equipment** - A device or item worn, used, or located for the safety and protection of LaRC personnel and Center visitors. Protective equipment is utilized when entering or performing work assignments in hazardous work environments or during hazardous conditions. Protective equipment includes: respirators and gas masks, barricades, traffic cones, lights, alarms, body harnesses and lanyards.

- **Normal Clothing** - An item of clothing furnished by an employee at their own expense as a condition of employment. Typical items of normal clothing are: dress or street shoes, shoe rubbers or boots, raincoats, standard work gloves, winter clothing for outdoor jobs, and wide brim hats or tinted sunglasses for sun protection. Certain items of normal clothing may be unacceptable in industrial work places and thus restricted from use. These items include sandals, tennis shoes, Bermuda shorts, and extremely loose clothing.

- **Appropriate Hair Length** - Exposed hair in excess of 2 inches may constitute a hazard in LaRC industrial work places.

1.6 RESPONSIBILITIES

The following paragraphs summarize responsibilities assigned to specific individuals on LaRC, ensuring the proper management and administration of personnel protection clothing and equipment.

1.6.1 Safety Manager

The Safety Manager is responsible of the issuance of personnel protection clothing and equipment in accordance with LAPD 1700.2, "Safety Assignments," and LaRC procurement procedures. In addition, the Safety Manager is responsible for the following activities:

- Providing advice to the Research Project Engineer, FSH, FC or supervisor concerning the determination and designation of hazardous areas and/or occupations where protective clothing and equipment are required,
- Determining the appropriate protective clothing and equipment authorized for use while working around hazards,
- Providing advice concerning the selection of personal safety devices, protective clothing, and equipment,
- Approving purchase requests for NASA-furnished protective clothing and equipment,
- Consulting with the proper medical authority, when professional medical advice is necessary, to determine specific requirements of protective clothing and equipment,
- Coordinating with radiation safety personnel to determine protective clothing and equipment requirements for items worn around ionizing and nonionizing radiation (see LPR 1710.5, "Ionizing Radiation," and LPR 1710.8, "Nonionizing Radiation"),
- Ensuring all applications for respiratory protective devices are specified,
- Ensuring workers issued respiratory protection equipment are fitted for use,
- Ensuring workers requiring respiratory protection equipment receive instruction from the Center's Industrial Hygienist concerning the use of and limitations of respiratory protection, and
- Ensuring that other required protective devices, such as gloves, ear protection, and goggles are issued and instruction provided concerning fitting and maintenance requirements.

1.6.2 Cognizant Line Supervisor

Line supervisors shall have the following responsibilities concerning the issuance of personnel protection clothing and equipment:

- Surveying and identifying, for review by the Safety Manager, all actual and potentially hazardous work areas, job operations and working conditions where protective clothing or equipment may be essential for the safety and personal protection of employees,
- Initiating and approving stores stock requisitions for required protective clothing and equipment available in the Center's stores stock inventory. The approval of the requisition is subject to the verification of the need for and appropriateness of the items requisitioned, and
- Ensuring that each employee under their jurisdiction is aware of the specific protective clothing and equipment requirements for work assignments and is trained in the use and safety limitations of those items.

1.6.3 Office of Human Resources

The Office of Human Resources shall provide new employees with information concerning job specific requirements for apparel or clothing. Specifically, new employees shall be informed when items must be furnished at the employee’s

expense. These items shall be required for employees to perform their assigned job functions and are a condition of employment.

1.7 ACCOUNTABILITY AND CONTROL

Protective clothing and equipment issued by LaRC shall be accounted for and controlled by applicable Agency and Center property control procedures.

1.8 FAIR WEAR AND TEAR, LOST, DAMAGED, OR DESTROYED ITEMS

Items, which have served their purpose through normal wear and tear, shall be turned in by the user to the cognizant supervisor for disposal. Items, which become lost, misplaced, damaged, or destroyed, shall be reported to the cognizant supervisor prior to issuance of replacement. The supervisor shall account for such items in accordance with applicable Agency and Center property control procedures.

1.9 CLEANING OF CLOTHING/LOAN OF PERSONAL PROTECTION EQUIPMENT (PPE)

Protective clothing, as defined in this LPR, shall be laundered, cleaned, and decontaminated at Government expense. An annual purchase request is submitted through the Office of Logistics Management to cover laundry and/or dry cleaning services. Laundry and/or dry cleaning services are available for coveralls, towels, sheets, pillowcases, lab coats, pants, shirts, night suits, and jackets to all Government employees. The initiator, or designee of the purchase request for laundry or dry cleaning service shall ensure accountability of items cleaned and sign appropriate delivery tickets certifying quantities received.

Personal protective equipment (PPE) will not normally be issued to contractor personnel. However, the contract technical monitor or on-site supervisor shall contact the Safety Manager to obtain authorization for the issuance or loan of appropriate protective devices in an emergency or when such issuance is beneficial to the Government.

All Government personnel are required to use the appropriate protective clothing and devices designated for their work assignments.

Chapter 2

2. RESPIRATORY PROTECTION DEVICES

2.1 PURPOSE

This chapter provides instruction governing the issuance, maintenance and use of respiratory protection devices on LaRC.

2.2 OSHA REQUIREMENTS

Under OSHA regulation 1910.134, LaRC is responsible for:

- Providing respirators when such equipment is necessary to protect an employee's health,
- Providing respirators that are applicable and suitable for the purpose intended, and
- Establishing and maintaining a respirator protection program.

2.3 LaRC RESPIRATORY PROTECTION PLAN

The LaRC Respiratory Protection Plan provides guidance for situations where it is not possible, through the use of engineering techniques, to control human exposure to toxic chemical agents in the workplace or during emergency situations. The plan shall:

- Provide specific operating procedures, which govern the selection and use of respirators, ensuring that all respirators are approved and certified,
- Establish respirator selection criteria based on the hazards to which workers are exposed,
- Document employee instruction and training in the proper use and limitations of respirators,
- Specify the method that respirators are individually assigned to workers for their exclusive use,
- Specify the methods used to clean and disinfect the equipment,
- Outline the required inspection and maintenance process, and establish a timetable for these required events,
- Provide industrial hygiene surveillance of work area conditions where respirators are subject to be used, and
- Establish the required medical surveillance and physical ability of individuals to wear the provided respiratory equipment.

2.4 GENERAL REQUIREMENTS FOR RESPIRATORS

Use of respiratory protection devices shall be required whenever engineering controls are insufficient to assure personnel will not become exposed to hazardous levels of air contaminants or an oxygen deficient atmosphere.

Only respirators certified by the National Institute for Occupational Safety and Health shall be used on LaRC. The selection of respirators for use on the Center shall be based upon the requirements of each specific facility. Specifically, the concentration of materials and airborne contaminants, which could be encountered, shall be the primary consideration when making respirator selection. Air-purifying respirators shall never be used in atmospheres immediately dangerous to life and health or when the contaminant has poor warning properties.

Respirator users shall be instructed in the limitations of the respirator and the proper procedures for their use, maintenance and storage.

Where practical, respirators shall be issued to individual users for their exclusive use, and a record of respirator users shall be maintained. A suitable entry shall be made in the medical records of each user, and the user's medical status with regard to use of the respirator shall be reviewed by the appropriate medical personnel.

Line supervision shall have the day-to-day responsibility of insuring respiratory protection devices are replaced when necessary.

2.4.1 Specific Procedures For Air-Purifying Respirators

Air-purifying respirators shall be issued through the Office of Safety and Facility Assurance (OSFA) Industrial Hygienist. LaRC will provide such respiratory protection in the interests of employee safety, morale and concern. Consequently, respirators may be issued to employees even though the concentrations of airborne contaminants would not be great enough to otherwise warrant such action.

At the time the respirator is issued, the LaRC Industrial Hygienist shall conduct a qualitative fit check on the user. Since powered air-purifying respirators maintain positive pressure within the facepiece, a fit check for this type of respirator is not needed.

2.4.2 Specific Procedures For Atmospheric-Supplying Respirators

All atmospheric-supplying respirators shall be of the pressure-demand, open circuit type. This ensures positive pressure relative to ambient so that any leakage is outward rather than into the facepiece.

Atmospheric-supplying respirators shall be selected by the Safety Manager to assure compatibility with LaRC repair and maintenance capabilities.

2.5 MEDICAL AND TRAINING REQUIREMENTS

Individuals who are authorized to use respirators on LaRC shall be listed on an authorization list. The following paragraphs contain requirements for individuals to be on the authorization list.

2.5.1 Medical Surveillance

Respirator users shall be required to undergo an annual physical examination. The Occupational Health Services Office (OHSO) shall conduct a medical review of each proposed respirator user and the results of the medical reviews shall be reported to the Safety Manager. Additionally, the OHSO shall maintain all documentation concerning the examination process.

Each employee who is issued a respirator for use in the workplace shall be required to obtain an annual medical examination in compliance with LaRC Occupational Medical Examination Protocol (OMEP). The physician conducting the examination shall:

- Complete a medical history and physical examination,
- Complete the medical qualification examination respirator form,
- Direct the patient to the OSFA Industrial Hygienist for respirator training, and
- Notify the Safety Manager (Industrial Hygiene) if the patient is disapproved for respirator use.

2.5.2 Changes in Medical Status

If the employee's medical status changes or if the employee fails to report for the examination:

- The OHSO shall notify the Safety Manager, in writing.
- If an individual is no longer authorized to use a respirator, the Safety Manager shall immediately notify the FSH.
- The FSH shall provide the Safety Manager with written notification of the individual's change in duty status.
- The Safety Manager shall provide the OHSO a copy of the individual's change in duty status and the individual shall be removed from medical surveillance.

2.5.3 Management of Authorized Respirator Users List

The Safety Manager shall provide the list of personnel who have fulfilled the training and medical review requirements to the appropriate line supervisor and to the OHSO. This list shall be the official list of authorized respirator users. Supervisors shall ensure that the respirator users, while using their respirators, only perform tasks for which they are trained. The FSH shall immediately provide written notification to the Safety Manager of any proposed additions to or deletions from the official list of authorized respirator users. The Safety Manager shall provide OHSO any change to the respirator user list.

2.5.4 Authorization for Use

The FSH of each facility or research apparatus shall develop and maintain a list of personnel who are required to use respirators. This list shall be forwarded to the Safety Manager to obtain use authorization.

The Safety Manager shall ensure that basic respirator training is provided to users and forward to the OHSO a copy of the list of individuals who receive this training.

The FSH shall be responsible to ensure that personnel are trained to perform the specific tasks for which-the respirator is required. Written documentation of this training shall be provided to the Safety Manager once it is completed.

2.6 TYPES OF RESPIRATORS

The following paragraphs describe the types of respirators permitted for use on LaRC, as well as the repair, maintenance and inspection requirements for this equipment.

2.6.1 Air-Purifying Respirators

Air-purifying respirators (APR) function by passing ambient air, which is moved by the user's breathing action or by a blower, through an air-purifying element that removes the contaminates. The element uses filters to remove solid or liquid aerosols for the air the user breathes. Air-purifying respirators may be divided into two subclasses:

- Particulate-removing purifiers that intercept particles before they enter the facepiece, and
- Vapor and gas-removing purifiers that entrap gas or vapor molecules.

Powered Air-Purifying Respirators (PAPR's) are another class. They use a blower to force ambient air through air-purifying elements. Similar to non-powered air-purifying devices, PAPR's may be used with a variety of filter types, depending on the type of air contaminants present.

The PAPR is significantly heavier than the APR, and is more costly. However, it offers a higher level of protection against airborne contaminants and is generally more efficient in situations involving a high work rate.

2.6.2 Supplied-Air Respirators

Supplied Air Respirators, also known as Atmosphere Supplying Respirator and Airline Respirators, are referred to by various authorities by these different names. Regardless of their names, the function of these respirators is the same, i.e., to carry respirable air to the user through an airline from a remote source. The air supply provided by an airline respirator may be either:

- **Continuous-Flow -** providing a continuous rate of air, regardless of the users breathing pattern, or
- **Pressure-Demand Device -** introduces more air into the facepiece as a result of a pressure drop when the wearer takes a breath.

The American National Standards Institute (ANSI) has divided atmospheric supplying respirators into two subclasses:

- Self-Contained Breathing Apparatus (SCBA), and

- Airline Respirators, which use a stationary source of compressed air delivered to the respirator user through a high-pressure hose.

2.6.2.1 Advantages of Supplied Air Respirators

A supplied-air respirator can be used for a longer duration than a SCBA. It also provides significantly greater protection than an APR and the user need not overcome the breathing resistance encountered when using a non-powered APR. Airline respirators can be used in atmospheres where other respiratory protective devices cannot be operated, including oxygen-deficient environments. These respirators can also be used in an environment that is immediately dangerous to life and health, provided it has an auxiliary, self-contained air supply.

2.6.2.2 Disadvantages of Supplied Air Respirators

Supplied-air respirators have disadvantages that should be considered before they are authorized for use in a facility. They restrict the movement of the user to the length of the airline hose, and a hazard exists because the trailing airline hose has the potential to come into contact with machinery or vehicles that could sever the line or restrict the flow of air.

2.6.3 SCBA MAINTENANCE, REPAIR AND INSPECTION

SCBA respirators shall be inspected weekly and sanitized monthly or after each use as required by the manufacturer's recommendation and ANSI Z88.2 and Z88.5. The inspections shall be performed by the respirator users in order to assure continuing familiarity with the respirator. Check-sheets documenting the inspections shall be maintained at the facility using Langley Form 80, "SCBA Inspection and Maintenance Report for Self-Contained Breathing Apparatus," and Langley Form 73, "SCBA Inspection After Each Use Form."

2.6.3.1 SCBA Inspections

SCBA’s shall be inspected weekly, monthly and after every use. Additionally, the air cylinder shall be hydrostatically tested every 5 years. The procedures for these inspections are found in the MSA Bulletin No. 0105-51. A copy of this Bulletin shall be issued to every air pack operator.

2.6.3.2 Recharging Cylinders

The Safety Manager shall have responsibility to ensure that compressed air cylinders of SCBA respirators are recharged upon request. A permanent record of the cylinder recharging shall be maintained. Air, which is supply to compressed air cylinders, shall meet the requirements of the specification for Grade D breathing air as described in ANSI Z86.1.

2.6.3.3 Repair to SCBA Respirators

Also, the Safety Manager shall ensure that a repair capability to the extent recommended by respirator manufacturers, is available for these systems. All repairs shall be authorized and shall be performed by personnel trained by the manufacturer of

the equipment. A detailed record of all repairs conducted on these systems shall be maintained.

2.6.3.4 Maintenance

When a respirator has less than a full air cylinder, the unit shall be returned to the LaRC Fire Station, Facility 1248, to be recharged. The tank shall be charged until the gauge on the bottle reads - FULL.

If defects are found during an inspection, they shall be brought to the attention of the unit supervisor and the FSH. The defective SCBA shall be marked **"Danger - Defective Air Pack - Do Not Use"** and returned to the LaRC Fire Station for immediate repair.

Adjustments to SCBA equipment shall only be performed by certified personnel.

2.6.3.5 Program Audit

Elements of the atmospheric-supplying respiratory program shall be audited at the discretion of the Safety Manager. At a minimum there shall be a complete audit of the program on an annual basis.

Chapter 3

3. EYE AND FACE PROTECTION

3.1 PURPOSE

This chapter contains specific instructions for the authorization, issuance, and use of eye and face protective devices, including goggles, spectacles, face shields, and welding helmets.

3.2 PROTECTIVE EYEGLASSES

LaRC shall provide protective eyeglasses (safety glasses) to employees engaged in work operations or in work environments, when there is inherent danger to workers' eyes or the probability of incurring an eye injury is high. When the danger is high, protective eyeglasses shall be provided to workers in the following manner:

Employees engaged in operations such as cutting, grinding, machining, soldering, filing, fabricating and major maintenance work, and employees performing frequent survey, audit, inspection, or overview functions in eye hazardous areas, or employees performing in other work environments deemed by the Safety Manager to present eye hazard elements, shall be furnished protective eyeglasses at no cost to the employee. This policy also includes employees who are required to wear prescription eyeglasses in the normal course of these duties. However, the cost of the eye examination to obtain the prescription for the glasses will be borne by the employee.

3.2.1 Prescription Safety Glasses

Employees who are eligible for prescription safety glasses shall submit a prescription when initiating their request. Also, prescriptions shall not be accepted if they are more than 2 years old.

The repair or replacement of supplied prescription safety glasses will be borne by LaRC, provided such repair or replacement is a result of normal wear and usage, or accidental damage while performing work functions. Employees desiring a second pair of safety glasses may elect to procure them through the optical services of the OHSO. However, the cost of the second pair of safety glasses shall be borne by the employee.

Prescription safety glasses shall be manufactured to meet the applicable safety standards and requirements of approved safety glasses. These standards apply to both the lens and frame specifications. For safety purposes, there shall be no deviation from prescribed manufacturing standards when providing eye protection. Additionally, photogrey and contact lens are unacceptable in these work environments unless they are specifically required by an employee's eye prescription.

3.2.2 Procurement of Safety Glasses

An authorization from the Safety Manager shall be required in all cases where the optical services of the OHSO are used to provide safety glasses. Upon verification of

eligibility and need, the Safety Manager shall issue Langley Form 59, "Certification for Industrial Grade Safety Glasses," authorizing the employee to obtain prescription safety glasses through the OHSO. The OHSO, upon receipt of the authorization from the Safety Manager and prescription from the employee, shall arrange for the procurement and fitting of safety glasses.

3.3 PROTECTIVE EQUIPMENT

The Selection Chart on the following page illustrates and identifies the protective equipment, which is available for use on LaRC. The chart also contains recommended applications of the equipment to optimize eye and face protection while performing hazardous work. This protective equipment shall be required in work operations and work environments having the capacity to produce an injury to an employee's eyes or face. It also serves as a guide to employees and supervisors in selecting eye and face protectors consistent with prevalent working conditions.

3.3.1 Requisitioning Protective Equipment

Face and eye protective equipment and devices required for normal operations shall be obtained through the Safety Manager. When work efforts require special devices, such as, laser goggles, foundry devices, or newly developed devices, the required equipment shall be requisitioned through a Langley Form 125,"Purchase Request/Purchase Order," processed through the Safety Manager for approval.

3.3.2 Maintaining an Adequate Supply of Protective Equipment

Supervisors and/or FSH's shall ensure that their respective facilities maintain an adequate supply of protective equipment and devices, including appropriate protective devices for personnel who visit their facilities. They shall also ensure that employees and visiting personnel wear required protective equipment and devices while working in or visiting hazardous areas.

3.3.3 Identifying Hazardous Areas

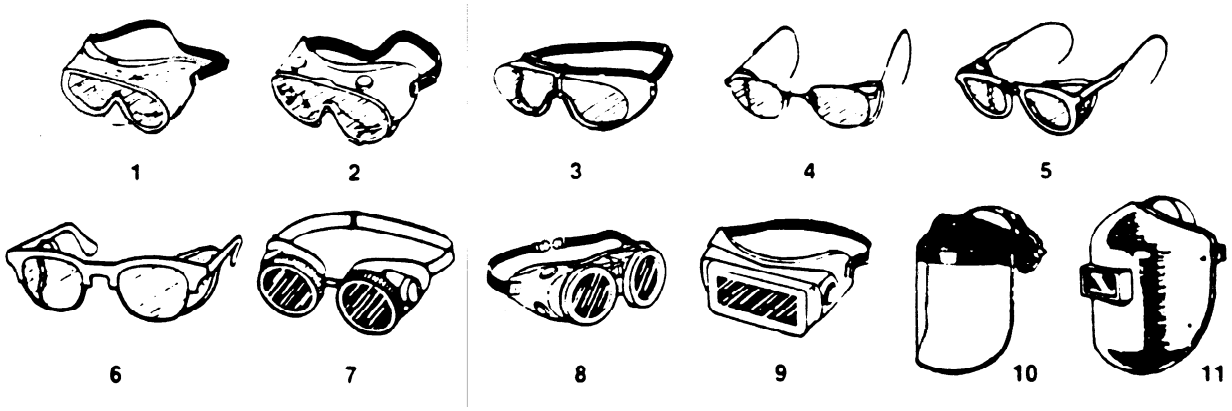
Hazardous areas shall be designated and shall be prominently identified by special signs and designators. Where necessary, the Safety Manager shall inspect and verify the locations of areas that present hazards to employees' eyes and faces. This inspection shall ensure that hazardous areas are properly designated and that protective devices and equipment are being used while performing work functions. Additionally, the Safety Manager shall make recommendations concerning the type of devices including goggles, spectacles, and face shields that are most suitable to the working conditions in that work area.

AMERICAN NATIONAL STANDARD Z87.1-1989 SELECTION CHART						PROTECTORS
		ASSESSMENT SEE NOTE (1)	PROTECTOR TYPE	PROTECTORS	LIMITATIONS	NOT RECOMMENDED
IMPACT	Chipping,grinding machining, masonry work, riveting and sanding	Flying fragments, objects, large chips, particles, sand, dirt etc.	B,C,D, E,F,G, H,I,J, K,L,N	Spectacles, goggles. faceshields SEE NOTES (1) (3) (5) (6) (10) For severe exposure add N	Protective devices do not provide unlimited protection. SEE NOTE (7)	Protectors that do not provide protection from side exposure. SEE NOTE (10) Filter or tinted lenses that restrict light transmittance, unless it Is determined that a glare hazard exists. Refer to OPTICAL RADIATION.
HEAT	Furnace operations, pouring, casting, hot dipping, gas cutting, and welding.	Hot sparks	B,C,D, E,F,G, H,I,J, K,L,*N	Faceshields, goggles spectacles *For severe exposure add N SEE NOTES (2) (3)	Spectacles, cup and cover type goggles do not provide unlimited facial protection. SEE NOTE (2)	Protectors that do not provide protection from side exposure.
		Splash from molten metals	*N	*Faceshields worn over goggles H, K		
		High temperature exposure	N	SEE NOTES (2) (3) Screen faceshields, Reflective faceshields SEE NOTES (2) (3)	SEE NOTE (3)	
CHEMICAL	Acid and chemicals handling, degreasing plating	Splash	G,H,K *N	Goggles, eyecup and cover types *For severe exposure, add N	Ventilation should be adequate but well protected from splash entry	Spectacles, welding helmets, handshields
		Irritating mists	G	Special purpose goggles	SEE NOTE (3)	
DUST	Woodworking, batting, general dusty conditions	Nuisance dust	G,H,K	Goggles, eyecup and cover types	Atmospheric conditions and the restricted ventilaton of the protector can cause lenses to fog. Frequent cleaning may be required.	
OPTICAL RADIATION	WELDING: Electric Arc		O,P,Q	TYPICAL FILTER LENS SHADE / PRO TECTORS SEE NOTE (9) 10-14 Welding Helmets or Welding Shields	Protection from optical radiation Is directly related to filter lens density. SEE NOTE (4). Select the darkest shade that allows adequate task performance.	Protectors that do not provide protection from optical radiation. SEE NOTE (4)
	WELDING: Gas CUTTING TORCH BRAZING		J,K,L, M,N,O, P,Q	SEE NOTE (9) 4-6 Welding Goggles or Welding Faceshield 3-6 3-4	SEE NOTE (3)	
	TORCH SOLDERING		B,C,D, E,F,N	1.5-3 Spectacles or Welding Faceshield		
	GLARE		A,B	Spectacles SEE NOTES (9) (10)	Shaded or Special Purpose lenses, as suitable. SEE NOTE (8)	

Selection Chart

ANSI (Z87.1 – 1989) Recommended Eye and Face Protectors for Use in Industry, Schools and Colleges

Figure 3.1, American National Standard Z87.1-1989, Selection Chart



1 GOGGLES Flexible Fitting Regular Ventilation
2 GOGGLES Flexible Fitting Hooded Ventilation
3 GOGGLES Cushioned Fitting Rigid Body
4 SPECTACLES Metal Frame with Sideshields
5 SPECTACLES Plastic Frame with Sideshields
6 SPECTACLES Metal-Plastic Frame with Sideshields
**7 WELDING GOGGLES Eyecup Type Tinted Lenses (Illustrated)
7A CHIPPING GOGGLES Eyecup Type Clear Safety Lenses (Not Illustrated
**8 WELDING GOGGLES Coverspec Type Tinted Lenses (Illustrated)
8A Chipping GOGGLES Coverspec Type Clear Safety Lenses (Not Illustrated)
**9 WELDING GOGGLES Coverspec Type Tinted Plate Lens
10 FACE SHIELD (Available with Plastic or Mesh Window)
**11 WELDING HELMETS

* Non-sideshield spectacles are available for limited hazard use requiring only frontal protection
** See Selection of Shade Numbers for Welding Filters (ANSI Z87.1 – 1989)

APPLICATIONS

OPERATION	HAZARDS	RECOMMENDED PROTECTORS: Bold Type Numbers Signify Preferred Protection
Acetylene Burning Acetylene Cutting Acetylene Welding	Sparks Harmful Rays Molten Metal Flying Particles	**7**, **8**, **9**
Chemical Handling	Splash Acid Burns Fumes	**2**, 10 (For severe exposure add **10** over **2**)
Chipping	Flying Particles	**1**, **3**, 4, 5, 6, **7A**, **8A**
Electric Arc Welding	Sparks Intense Rays Molten Metals	9, **11** (**11** in combination with 4, 5, 6 in tinted lenses advisable
Furnace Operation	Glare Heat Molten Metal	**7**, **8**, **9** (For severe exposures add **10**)
Grinding Light	Flying Particles	**1**, **3**, **4**, **5**, **6**, 10
Grinding Heavy	Flying Particles	**1**, **3**, **7A**, **8A** (For severe exposure add **10**)
Laboratory	Chemical Splash Glass Breakage	**2** (10 when in combination with **4**, **5**, **6**)
Machining	Flying Particles	**1**, **3**, **4**, **5**, **6**, 10
Molten Metals	Heat Glare Sparks Splash	7, 8, (10 in combination with **4**, **5**, **6** in tinted lenses)
Spot Welding	Flying Particles Sparks	**1**, **3**, **4**, **5**, **6**, 10

Figure 3.2, American National Standard Z87.1 - 1989, Protective Devices

Chapter 4

4. PROTECTIVE FOOTWEAR

4.1 POLICY

LaRC shall provide protective footwear to civil service employees engaged in work operations where there is an inherent or high probability for foot hazards or foot injuries. Employees substantially engaged in continuous work situations where foot hazards are present shall be furnished appropriate protective footwear at no cost to the employee. These situations include work involving:

- Hot substances,
- Corrosive substances
- Poisonous substances,
- Foundry operations,
- Pyrotechnic activities, or
- Other work environments deemed by the Safety Manager to present foot hazards.

Civil Service employees engaged in shop-type activities and other specific work environments and occupations shall be encouraged to use appropriate protective footwear which precludes injury from falling objects, crushing actions, and penetrating actions. Occupational activities in this category include:

- Pipefitters,
- Heavy or outside machinists,
- Material fabricators and
- Material handlers.

The cost to repair required protective footwear for civil servants shall be borne by LaRC.

4.2 RESPONSIBILITIES

Responsibilities concerning the use of protective footwear are discussed in the following paragraphs.

4.2.1 Safety Manager

The Safety Manager is responsible for:

- Implementing and maintaining the protective footwear program, including the procurement and issuance of protective footwear to designated employees,
- Determining the areas of operation and work environments where the use of protective footwear is required, and
- Reviewing and approving all requests for protective footwear.

4.2.2 Line Supervisors

Line supervisors shall be responsible for:

- Initiating requests to acquire protective footwear for employees,
- Forwarding requests through their respective Organizational Unit Managers to the Safety Manager, and
- Assuring that the furnished protective footwear is worn by employees in designated foot hazard areas.

4.2.3 Employees

Employees shall be responsible for the normal care and appropriate use of protective footwear. They shall also return used footwear for replacement, or repair when required. Employees shall be restricted from wearing defective or worn-out protective footwear, which could contribute to a foot injury.

Chapter 5

5. HEARING PROTECTION DEVICES

5.1 PURPOSE

This chapter provides instructions for the issuance and use of hearing protection devices on LaRC. Issues concerning the LaRC Noise Control and Hearing Conservation Program are referred to in LPR 2710.1.

Uncontrolled, noise can cause numerous hazards in the work place. Employees shall protect themselves from excessive noise levels in order to prevent:

- Being annoyed by noise in the workplace,
- Having their concentration disrupted when working on assigned tasks,
- Suffering from ear pain,
- Suffering from nausea,
- Incurring a permanent noise-induced hearing loss, and
- In extreme cases, incurring other health complications.

5.2 GENERAL REQUIREMENTS

Generally, whenever noise levels exceed an eight-hour time-weighted average (TWA) of 90 decibels, OSHA requires that administrative and engineering controls be utilized to limit employees' exposure to noise. When administrative and engineering controls cannot reduce the noise to an acceptable level, personal protective equipment (PPE) shall be required.

The use of hearing protection devices is required on LaRC whenever personnel are exposed to sound pressure levels in excess of:

- 85 dBA for steady sound pressure and/or intermittent noise, or
- 140 dB peak sound pressure or greater for impact/impulse noise.

5.3 PROTECTION AGAINST NOISE HAZARDS

Hearing protection devices such as earplugs and/or earmuffs are the primary methods used to protect the hearing of employees who work in noise hazardous areas. These protective devices are designed to reduce hazardous noise while allowing passage of sounds, which fall in the speech frequency range. This allows workers to safely communicate with each other while working.

Earplugs and/or earmuffs allow employees to work in a high noise area without developing a hearing loss. In most situations, one or the other device will provide adequate protection, however, there are some noise conditions requiring both earplugs and muffs to be worn at the same time.

5.4 TYPES OF PERSONNEL PROTECTIVE EQUIPMENT (PPE)

Hearing protection devices provided to workers on LaRC shall be either earplugs or earmuffs. Earplugs are individually available at hazardous noise areas while ear muffs are issued on an individual basis through the OSFA Industrial Hygienist.

Hearing protection devices shall possess a Noise Reduction Rating of at least 20 dB as defined by the Environmental Protection Agency. Communications headsets may be worn in noise hazardous areas as a hearing protection device if they provide the required amount of hearing protection.

Both ear plugs and earmuffs shall be worn when personnel are exposed to steady and/or intermittent sound pressure levels of 110 dBA or above.

5.4.1 Disposable Earplugs

Disposable earplugs shall be provided to employees to be used one time and then thrown away. They are made of an expandable foam material designed to be inserted into the ear canal to block out noise hazards. Personnel shall wash their hands before using these earplugs and should keep them free from grease and dirt.

5.4.2 Earmuffs

Earmuffs cover the external ear to provide a barrier against hazardous noise. They shall be equipped with soft plastic cushions, which are filled with either foam or liquid. They must form a perfect seal around the ear to be effective. Glasses, long sideburns, long hair, and facial movements, such as chewing, can reduce their protective qualities.

Earmuffs shall be kept clean by regularly wiping them with a damp cloth, and the cushions shall be replaced when they become worn, stiff or torn.

5.5 EXAMPLES OF NOISE LEVELS:

The basic unit of level in acoustics is the "Decibel" (dB). In acoustics, the term "level" is used to designate that the quantity is referred to some reference value, which is either stated or implied. The letter following dB, i.e. A, B, or C represents frequency characteristics of the average human ear for various sound intensities, these are called "weighting networks." The "A" weighted network is the relative frequency response of the average ear when sound pressure levels of about 20 to 30 dB are heard. Examples of approximate decibel levels for selected situations are as follows:

SITUATION	DECIBEL LEVEL
Soft whisper -	30 decibels
Conversational Speech-	60 decibels
Printing press plant -	90 decibels
Pneumatic drill -	100 decibels
Jackhammer -	125 decibels
Jet plane -	140 decibels
Rocket launching pad -	180 decibels

5.5.1 RESPONSIBILITIES

Line supervisors shall have day-to-day responsibility for ensuring hearing protection devices are worn in noise hazardous areas. Users shall be instructed in the limitations of hearing devices and in proper procedures for their use, maintenance and storage.

A record of employees who use hearing protection devices shall be maintained, and an entry shall be made in the medical records of each user. Additionally, the medical status of employees who work in noise hazard shall be reviewed by the medical staff, in regard to the use of the hearing protection device.

A supply of hearing protection devices, including disposable earplugs, shall be maintained at noise hazardous areas for visitors, transients and personnel who do not have individually issued earmuffs in their possession.

5.6 LaRC NOISE CONTROL AND HEARING CONSERVATION PROGRAM

Government employees, who are exposed to noise levels above the NASA Action level, shall be placed in the LaRC Noise and Control Hearing Conservation Program (NCHCP). The LaRC NCHCP is used to measure any change in employee's hearing from year to year while working in a high noise area. Employees placed in this program shall undergo medical surveillance and receive annual training.

5.6.1 Medical Surveillance

Individuals in the LaRC NCHCP are required to undergo a pre-certification, annual and termination physical examinations in compliance with LaRC OMEP's.

5.6.2 Training Requirements.

There shall be an annual training program for employees who are in the LaRC NCHCP. This annual training is the responsibility of the OHSO.